12. (**New**) The process as claimed in claim 11, wherein the impure *(R)*- and *(S)*-α-hydroxycarboxylic acids are prepared by acidic hydrolysis of the *(R)*- and *(S)*-cyanohydrins obtained by enzyme-catalyzed addition of a cyanide group donor to the corresponding optionally substituted aliphatic, aromatic or heteroaromatic aldehydes or ketones.

13. (**New**) The process as claimed in claim 11, wherein impure, aromatic *(R)*- and *(S)*-α-hydroxycarboxylic acids of the formula $Ar\text{-}(CH_2)_nCH(OH)CO_2H$ in which n is 0 or an integer from 1 to 5 and Ar is an aryl or heteroaryl radical which is unsubstituted or mono- or polysubstituted by OH, C_1-C_4-alkyl or -alkoxy, thioalkyl, halogen, optionally substituted phenyl or phenoxy, amino or nitro, are employed.

14. (**New**) The process as claimed in claim 11, wherein *(R)*-2-chloromandelic acid is employed.

15. (**New**) The process as claimed in claim 11, wherein the α-hydroxycarboxylic acid to be purified is dissolved in the appropriate solvent with warming, then the solution is slowly cooled to 15 - 50°C and, after a standing time of five minutes to 20 hours, the crystallized product is filtered off, and the crystallizate is washed with the same solvent and dried.

16. (**New**) A process for the preparation of chemically and optically highly pure *(R)*- and *(S)*-α-hydroxycarboxylic acids, which comprises treating the hydrolysis solution obtained by acidic hydrolysis of the *(R)*- and *(S)*-cyanohydrins, prepared by enzyme-catalyzed addition of a cyanide group donor to the corresponding aldehydes or ketones, directly with an aromatic hydrocarbon, optionally in combination with a cosolvent, then extracting the mixture at hydrolysis temperature, whereupon after cooling of the organic phase the corresponding chemically and optically highly pure *(R)*- and *(S)*-α-hydroxycarboxylic acids having an optical purity of over 98%ee crystallize out.

17. **(New)** The process as claimed in claim 16, wherein chemically and optically highly pure aromatic *(R)*- and *(S)*-α-hydroxycarboxylic acids of the formula Ar- $(CH_2)_nCH(OH)CO_2H$ in which n is 0 or an integer from 1 to 5 and Ar is an aryl or heteroaryl radical which is unsubstituted or substituted by OH, C_1-C_4-alkyl or alkoxy, thioalkyl, halogen, optionally substituted phenyl or phenoxy, amino or nitro, are prepared.

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18. **(New)** The process as claimed in claim 11 or 16, wherein toluene, xylene, benzene, ethylbenzene, isopropylbenzene or chlorobenzenes are employed as aromatic hydrocarbons.

19. **(New)** The process as claimed in claim 11 or 16, wherein the cosolvent employed is a solvent which increases the solubility of the hydroxycarboxylic acid in the organic phase and which is separable by distillation, in an amount from 5 to 50% by volume.